The Glass Industry
REG. U. S. PAT. OFF.

Vol. 14 DECEMBER, 1933 No. 12

GLASS PLAYS IMPORTANT PART IN ROCKEFELLER CENTER

By R. G. Skerrett

ROCKEFELLER CENTER has now reached a stage that makes it possible for one to visualize what that city within a city will be when all twelve of its projected structures are completed. To date, six of the buildings are either finished or nearly so, while work on two more is in hand. The dominating RCA Building, which towers 850 feet above the street level, is ready for occupancy; and it is this key edifice that symbolizes the whole splendid undertaking which occupies an area of twelve acres in the very heart of New York City's midtown intensely active business area.

When brought to its architectural climax, a relatively short span of months hence, Rockefeller Center will represent a total outlay of approximately $250,000,000—the largest sum yet expended in a private development of a kindred nature. The dimensions and the arrangement of the associated structures are such that none of the buildings will hamper the flood of natural light or the free sweep of the surrounding atmosphere. The so-called "stagger plan" adopted to insure these desirable ends has placed the RCA Building in the center of the three-block reservation and has arranged the other structures so that a beautifully balanced effect is assured.

According to the experts in such matters, and figuring the permanent population for commercial type buildings at the rate of one person for each 110 square feet of rentable area, Rockefeller Center, when all its space is rented, will have a resident daily population of 34,500 persons. Nearly half of this number—that is, 16,500 people—will be concentrated within the 70-story RCA Building; and the remainder will be distributed in the lesser but nevertheless capacious associate structures. It should be pointed out, however, that the music hall, the theater, the restaurants, the shops, and other places of attraction will draw to Rockefeller Center daily for one purpose or another something more than 215,000 people. To provide adequately for visitors, operating personnels, and thousands of employees in the many departments of business represented in Rockefeller Center, conveniences, comforts, measures of security, and means of carrying on diversified activities efficiently have been provided on a scale heretofore unapproached. In addition, facilities are to be found in the development that are distinctly novel.

The transformation being wrought in the three blocks occupied by Rockefeller Center can be grasped more understandingly if one be reminded that the area was until recently devoted to 229 residences and shops, and at the peak of activities accommodated 4,000 persons. Those homes and places of business were bought for $7,000,000 and then razed so that great excavations could be carried to a maximum depth of 40 feet to provide capacious subbasements for a group of buildings of a typically modern and totally different character from those that had long been identified with the neighborhood. The amount of excavation work for the entire development aggregated 624,000 cubic yards and weighed substantially 1,250,000 tons. It is interesting to learn that the weight of all the buildings in Rockefeller Center when completed—notwithstanding their heights and bulks—will be about 917,000 tons, and, therefore, considerably less ponderous than the mass of materials dug out of the ground to provide seatings for their foundations.

To insure abundant natural lighting, interior arrangements of the business structures in Rockefeller Center are such that no part of any rented space is more than 27 feet from a window; and the buildings when completed will have no fewer than 28,000 windows, and quite 10,000 doors and office partitions will be fitted with innumerable glass panels. Take, for instance, the RCA Building as an example of what glass means in carrying out the important function of transmitting the light of day. That structure has 6,045 exterior window openings above the ground floor, and those windows contain a total of 19,700 panes of glass. The smallest of the panes measures 6 inches by 18 inches and form segments of the casement windows. The largest panes constituting the center sections of the huge show

windows on the mezzanine floor, measure 9 feet by 12 feet. The show windows, the casement windows, and the lower sash of the double-hung windows are of plate glass. Thirty-six of the 6,045 windows are show windows, 185 are casement windows, and 5,824 are regular double-hung windows. The windows range in size from 4 feet by 6 feet, in the case of the double-hung windows, to 9 feet by 16 feet in the large show windows. All but 24 of the casement windows are on the 65th floor or above that level where the top of the 70-story tower is designed for observation space and other special uses. The central tower is capped by an observatory. At the extreme top, 850 feet above the street, an esplanade offers an unobstructed view of New York and the surrounding territory. Below that floor there is a terrace, partly enclosed by a glass shelter, for use in cold or windy weather; and below the terrace there is a glass-protected dining space, so designed that no pillars will interfere with the full sweep of the view.

The glass in the RCA Building has a surface area of 168,340 square feet. The 19,700 panes, if placed together on a flat surface, would cover an area of nearly four acres—approximately one-third of the total ground space of Rockefeller Center. It is estimated that 375 eight-hour man-days were required for the fabrication of the glass—225 days for the plate glass and 150 days for the window glass—that forms the upper lights in the double-hung windows. A total of 970 man-days were required for the installing of the glass. All told, the buildings designed for Rockefeller Center will call for quite 1,000,000 square feet of glass—enough to cover 23 acres if all the sheets were arranged edge to edge. The plate and the sheet glass have a combined weight of 690 tons. The contract for the glass just mentioned was awarded the Pittsburgh Plate Glass Company.

Aside from the familiar services of glass in windows, office partitions, doors, etc., glass in a number of directions is contributing strikingly to the decorative aspect of Rockefeller Center. Last January, THE GLASS INDUSTRY described at some length the spectacular glass mosaic designed by Barry Faulkner for the loggia at the western entrance of the RCA Building—a panel 79 feet long and 14 feet high. More recently the wall separating the loggia from the main lobby of the RCA Building has received Lee Lawrie's huge cast-glass window screen which has a lateral sweep of 70 feet. The modeling and the coloring of the three great panels are such that they interpret the artist's conception of light in its manifold forms—and Light, in this case, symbolizing the broader education and the better understanding of mankind as typified by the present-day stage of human progress.

The RKO Photoplay Theater of Rockefeller Center boasts the largest chandelier in the world. It is 25 feet in diameter, weighs six and a half tons, and carries 400 flood lights and their large lenses. The great array of special colored lamps, backed by their reflecting mirrors, consume 104,000 watts of electric energy, that is, current enough during a single night's performance to provide light for an

entire week for the average office building. By crossing and blending colored light rays meeting from two directions, it is possible to produce a great number of unusual color effects. The entire theater can be bathed in varying degrees of intensity with the glow of red, blue, green, or amber light.

In the same theater, there is an illuminated glass mural symbolizing Amelia Earhart's crossing of the Atlantic. It was designed and executed by Maurice Heaton, and was

produced by a new process. The mural is 6 feet high and 18 feet long, and is the dominating decorative feature of the Women's Lounge. Heaton's method consisted of applying colored glazes on clear glass with the aid of an air brush, and the colors were afterwards fused on the glass by exposure to a temperature of 1,200° F. The base of his decoration is window glass; and the mural is illuminated by light reflected from a special ribbed mirror in the rear of the glass panel. To the left and to the right of the mural are vertical panels of 19 crystal glass rods, with a plate of colored glass in front of them. The design on this decorated glass sheet is made up of a series of simple curves. Seen through the crystal rods, when illuminated from behind, the design changes in form as one looks at the picture from different angles.

Glass in a multiplicity of ways serves to embellish and to illumine the Radio City Music Hall, capable of accommodating 6,000 patrons. That place of amusement contains among other features two 29-foot glass chandeliers, each weighing two tons, that are suspended from the ceiling of the Grand Foyer and cast their light upon the foyer, the staircases, and Ezra Winter's arresting mural, The Fountain of Youth. In the general illumination of the Music Hall, and the stage, glass plays its important part as in the neighboring RKO Photoplay Theater. At every turn in rest rooms and the like, in passageways, and in other parts of this place of entertainment, glass for illumination or for embellishment performs the twofold function of utility and adornment. Indeed, on all sides one has evidence of the varied uses to which the modern architect and the interior decorator utilize glass either for convenience or to produce pleasing effects. A great deal of the special glass employed in Rockefeller Center has been manufactured by the Corning Glass Works, of Corning, N. Y.

New York Ceramic Industries Association Formed

IN response to a call by the New York State College of Ceramics a meeting of representatives of the ceramic industries of the State was held at Alfred on November 9th. Although the weather was very unfavorable the attendance was good.

No formal program was arranged. The entire day was spent in discussing and taking action on the proposal that New York have a state ceramic association and experiment station. After a very thorough discussion of the proposal from all angles, the action was enthusiastically positive and the association was organized. Mr. J. L. Jova, Secretary and Manager of the Jova Brick Works was elected President. Dean M. E. Holmes of the New York State College of Ceramics was elected Secretary-Treasurer. The following men were appointed a Board of Directors:

Heavy Clay Products, J. L. Jova, Jova Brick Works, Roseton, N. Y. Clarence Austin, Binghamton Brick Co, Binghamton.

Whitewares, Edward Schramm, Onondaga Pottery Co., Syracuse.

Glass, J. C. Hostetter, Corning Glass Works, Corning.

Gypsum, lime, cement, F. M. Thorman, United States Gypsum Co., Oakfield.

Terra Cotta, M. C. Gregory, Corning Terra Cotta Co., Corning.

Enameled Ware, E. G. Miner, Pfaudler Company, Rochester.

Refractories and Abrasives, C. J. Easter, Carborundum Company, Niagara Falls.

(*Continued on page* 131)

Two Recent Reviews Of Importance

By F. W. Preston

THERE have recently appeared several books and pamphlets surveying certain fields in the province of glass technology that are worth special notice here. We have already (September issue) noticed Bernard Long's introductory survey of the whole province of the Physics of Glass; more recently (November issue) we commented on a book by J. T. Littleton and George Morey on the specialized field of the Electrical Properties of Glass. We wish also to direct attention to two other brief surveys: the Compilation of Equilibrium Diagrams of Hall and Insley which occupies the whole of the October (1933) issue of the *Journal of the American Ceramic Society*: and a paper by L. H. Adams on the Annealing of Glass in the *Journal of the Franklin Institute* for July 1933 (Vol. 216—pp. 39-71.

The former of these—the Hall and Insley compilation—deals with a field which most glass manufacturers regard as rather academic. Even glass technologists, other than those actually engaged in the researches listed, frequently regard the subject as a little irrevelant. The subject is by no means so unrelated to practical problems as many believe, and as the knowledge thereof becomes more complete, it will be easier to make practical use of it. At present, in the diagnosis of trouble, a logical and direct attack can often be inaugurated from such knowledge as we have, but the logic sooner or later strikes a hiatus, and we have to jump gaps. This is particularly annoying, since tank troubles are generally a matter of remote analysis. We cannot get into a tank: we can see very little in a tank. And putting two and two together about the ailments of tanks is frequently a very difficult matter. It is a little unfortunate that the Hall and Insley compilation had to appear ahead of the Geophysical paper on the Soda-Alumina-Silica ternary system. The four-component system, Soda-Lime-Alumina-Silica, is the system of most interest to glass men. We have taken three components at a time and mapped out something of their behavior: thus we have a flock of papers on Soda-Lime-Silica, which is only occasionally of interest; on Lime, Alumina, Silica, which is of most importance, but more often to the ceramist than the glass man; on Soda, Lime, Alumina; and just recently the Soda-Alumina-Silica one—probably the most important of the four—, the work having been completed but not as yet published. Since such a large part of the glass manufacturers' troubles arise directly or indirectly from the action of soda and lime on alumino-silicate tank blocks, an understanding of the equilibrium conditions may be of first rate importance at times. Unfortunately it is rarely sufficient of itself, and must be supplemented by other studies.

The Hall and Insley compilation has the advantage of being preceded by a sensible account of how to use the diagrams. The subject is full of little complications, especially when solid solutions are involved. Most of the diagrams of interest to glass men have already appeared in compiled form in the Glastechnische Tabellen and elsewhere, but a sound introduction to the subject in the English language is a thing the Tabellen did not provide.

We turn now to other work—L. H. Adams on Annealing.

This work has the misfortune to appear just ahead of J. T. Littleton's paper given at the State College Symposium on Oct. 20, on the physical sense of the Adams and Williamson equation for rate of strain-release. Many have complained that the equation is nonsense (e. g. T. Smith in England), and the force of their objection has been felt by most of us. The present reviewer deduced the law for dimensional considerations, but very few people are satisfied by dimensional reasoning. Littleton has tried to square things and make peace in the camp by proving both parties are right—the holders by the equation and the objectors to it—inasmuch as the "viscosity" of glass during the release of the strain is a function of the time, just as the stress itself is, and in the same proportions. This sounds a little complicated, but he has made out a good case for it.

Adams clearly had an inkling of such a development, as is shown on p. 65 of his review, but if the facts can now be regarded as established, it will soon be necessary to review the subject again.

Ignoring this situation however, the Adams paper is one of consequence by reason of its introduction of marked simplifications with the treatment of the subject. The early Adams and Williamson work was a masterpiece of ingenuity and painstaking observations, but the formulae were a bit complicated. Too much had to be specified before we could get started on its application to practice, and the various "constants" had no names by which one could love them.

A great stride forward is taken by the recommendation that the "initial stress"—the stress the glass has before annealing at all—shall be taken as theoretically infinite. This is vastly better than saying "let it be 50*mu* per cm" which means nothing to most people and very little to the rest. Adams shows that as long as the glass is *very* badly strained to start with (which everybody knows it will be if it doesn't go through a lehr at all), it doesn't matter more than two or three per cent *how* badly it is strained. In other words, for our purpose, a totally unannealed bottle may be considered "infinitely strained", or in American vernacular a "hell of a strain" is an infinite strain for purposes of calculation.

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Putting Trade Acceptances In The New Deal

APPROXIMATELY five billion dollars in frozen credit could be released by using trade acceptances. The Federal administration has given considerable attention to the development of plans for the more general use of trade acceptances. This policy is in line with the avowed purpose of keeping business finances in a more liquid condition as opposed to the frozen credit represented by open accounts.

It is estimated that the total of open accounts carried by creditors at any given time approximates five billion dollars. In most instances these open accounts may be classed as frozen credit, because it is difficult to borrow money on such accounts on a reasonable basis.

While bankers may be pleased to note that accounts receivable constitute a sizeable item on the financial statement, business men have found it difficult to borrow on one-name paper with accounts receivable as security. But if such accounts are converted into trade acceptances, these acceptances may be discounted with any member of the Federal Reserve System. In fact, the Federal Reserve banks have indicated that more commercial transactions should be settled with trade acceptances.

It is difficult to imagine just what the result would be if several million dollars in open accounts would be replaced with trade acceptances in a single year. These trade acceptances, if rediscounted, would force additional billions of currency into the business stream. The effect would be startling. Small wonder then that the administration is considering ways and means for promoting the use of trade acceptances.

In no other commercial nation of the world is the trade acceptance so little understood and used, despite the acknowledgment that business would benefit if it were used more freely. The principal reason, it is claimed, why debtors prefer the open account basis, is because they are accorded more freedom in meeting their obligations.

For instance, terms of ninety days for open account purchases are readily construed as meaning ninety-five or one hundred days, whereas a trade acceptance is due on the date specified. These easy-going methods of meeting financial obligations must be corrected, it is said, before we will be able to appreciate the benefits to be derived from the use of trade acceptances.

However, we might as well begin to set our houses in order because the plans now being made will bring the trade acceptance to greater prominence, solving many of our credit problems and strengthening the entire financial structure of our commercial system.

A trade acceptance is a draft, order or bill of exchange drawn by the seller of goods, merchandise, etc., upon his customer, the purchaser, and accepted by the purchaser and payable on a definite future date and at a designated place. The promise to pay is absolute and not subject to any qualifying conditions.

A trade acceptance is presumed to be part of a self-liquidating transaction, in that it is presumed that there is at all times up to the date of payment, actual existing value in the way of materials purchased or the proceeds received from their resale that will be used to pay the acceptance.

The terms of the acceptance should be exactly in conformity with regular terms applying in the trade or business using them. It should not be renewed. If the customer's bank balance is not sufficient to enable it being charged to the acceptor's account the same as a check the day it is due, the customer should be required to pay with a promissory note the balance due on the acceptance which he is not able to pay in cash.

In some cases the terms of sale are too short to justify their use, but where goods are sold on terms of thirty days or more, and the acceptances are mailed promptly and returned just as promptly by the customer, they will serve the purpose intended.

Where the seller allows cash discounts for payments within 30 or 60 days, and the customer insists upon the cash discount, the amount of the discount may be deducted from the invoice and the acceptance written for the net amount, to mature on the last discount date. If the acceptance is not honored by the bank when it matures, the cash discount is then charged back to the customer and another acceptance for the full amount of the invoice is then issued, to mature according to net terms of sale.

The trade acceptance has, when used to cover regular terms of sale, several advantages from a collection standpoint, in that the day it is due it automatically calls attention to itself in the hands of the bank where payable. Another advantage is that it is chargeable by the bank to the depositor's account the same as a check. It is also an acknowledgment of an amount certain that is due, whereas many grounds for disputing a monthly statement can arise or be imagined, as happens too often.

The customer in giving a trade acceptance places the seller in a better position to finance his business. Instead of the account being on the books with the capital tied up in accounts receivable, the acceptance is two-name paper which can be discounted and converted into cash. It is also well to remember that if you have borrowed from your bank up to the legal limit on your regular line of credit, your bank can still discount for you the trade acceptances of your customers bearing your indorsement.

Even if these acceptances are not discounted, they represent a secondary reserve in case of need.

October Production of Plate Glass

The total production of polished plate glass by the member companies of the Plate Glass Manufacturers of America, as reported by Secretary P. A. Hughes, for the month of October, 1933 was 5,793,693 sq. ft., as compared to 8,924,666 sq. ft. produced by the same companies in the preceding month September, 1933, and 3,935,416 sq. ft. produced by the Association members in the corresponding month last year, October, 1932.

Glass Industry

ESTABLISHED 1920

The First Trade Journal Devoted Primarily to Glass Technology, Engineering, Raw Materials and Glass Factory Equipment and Operation

PUBLISHED MONTHLY

Copyright, 1933, by

GLASS INDUSTRY PUBLISHING COMPANY, INC.

102 Maiden Lane, New York

Telephone BEekman 3—0474 Cable Address Glasdustry

G. W. Cooper, Managing Editor
Helen Glass, Business Manager

Subscription Price...United States $2.00 a Year; Foreign $3.00
Single Copy ..... 25 Cents

Vol. 14 DECEMBER, 1933 No. 12

CONTENTS

Glass Plays Important Part in Rockefeller Center 125

New York Ceramic Industries Association Formed 127

Two Recent Reviews of Importance 128

Putting Trade Acceptances in The New Deal 129

October Production of Plate Glass 129

Editorial:

Ancients Longed to Fly "Like an Eagle" 130

The New Large Field Polariscope for Glass 132

Inquiries Received 132

Annual Index to Contents 133

Current Prices of Glass-Making Materials 134

CLASSIFIED BUYERS' GUIDE, PAGE 7

INDEX TO ADVERTISEMENTS, PAGE 8

Reference to the contents of earlier issues of THE GLASS INDUSTRY can be found in THE INDUSTRIAL ARTS INDEX in many Public and Technical Libraries.

Ancients Longed to Fly "Like an Eagle"

This avoids entirely the use of *mu* per cm. at the start. The logical sequel is to use Littleton's suggestion for the final strain, viz, to describe it as a "final stress of 100 lb. per sq. in." or some similar comprehensible statement. Adams leaves it in the old form—2.5 *mu* per cm. (This is equivalent to about 14 lb./sq. in. with most glasses, and is too high a standard for ordinary glassware.)

Making the simplification proposed by Adams, it is shown that the annealing schedule may be set out in comparatively straightforward fashion by a few simple calculations.

In practice it is not quite so simple a thing to anneal an awkward shaped object like a bottle, as it is to anneal (theoretically) a slab or disc of glass isolated from the rest of the universe except for banks of rheostats or cooling tubes around it. We can expect to hear now from the practising technologists, as to how far the new Adams proposals can simplify the setting out of proper annealing schedules in Industry. No doubt Bailey and Sharp and some of the other protagonists of sensible annealing will be heard from in the coming months.

Adams (page 68) mentions that viscosity at room temperature must be "at least" 10^{28} C. G. S. units. This is parsimonious in comparison with the estimates of the present reviewer that it ought to be 10^{70}, and of J. T. Littleton that it ought to be not far short of this last. The difference in the Adams estimate is probably due to the extrapolation being based on the assumption that the viscosity continues to double for a fall of every 10°C (the "Twyman interval"). It is known that this Twyman interval does not apply much above the annealing range, and there is no reason to suppose it applies much below it. It just happens that it *does* apply at the annealing range. Below it, the viscosity doubles for increasingly shorter temperature intervals, and above it, for increasingly longer intervals.

However, the gist of the matter is, if Littleton's latest discoveries are confirmed, that "viscosity" is a term without a meaning of any consequence by the time glass has cooled to the annealing temperature. It becomes increasingly meaningless as the temperature drops still further. After all, "viscosity" is not a physical property of glass. The "coefficient of viscosity", which we usually call for short, "the viscosity", is a mathematical abstraction, and it is assumed to be a real physical property if it is found to be constant for all reasonable variations of the experiment. When the experiment must be made subject to rather elaborate restrictions (as at the annealing point) or when it cannot be made at all (as at room temperature) we are talking about the physical existence of an imaginary mathematical abstraction. That will be enough for today.

CENTURIES ago, what may have been the first attempt recorded in history to construct and operate a practical flying machine, was made in Britain. According to Lewis Spence, author of "The Mysteries of Britain", a story that originally appeared in Geoffreys on Monmouth's

(*Continued on page* 132)

Fall Convention of Pacific Coast Distributors

The Pacific Coast Division of the National Glass Distributors Association held their Fall convention at the Jonathon Club, Los Angeles, November 9, 10, and 11. Harry Thompson of the Thompson Glass and Paint Company, the new vice-president, presided. A sudden pall, however, was cast over the meeting due to the death of Roy Thompson, of the Pacific Glass Company, Los Angeles, who was in an automobile accident on the morning of November 9. Out of respect to his memory a resolution of sympathy to his children was adopted and the meeting adjourned.

Later the convention reconvened. The following nominations were submitted and nominees unanimously elected: Vice-president, Harry I. Thompson, for members of the executive committee: One-year term: George Fitzgibbon, two-year term: Wallace F. Bennett, three-year term: Harry Brawner. The chairman next apponited Harry Brawner as general chairman of the factory relations committee, with authority to appoint his own committees to assist in his work. The members of the sub-committees are as follows: Plate and Safety Glass: Morris Tyre, Bill Keene, Bob Fulton and Lloyd Cobbledick. Window Glass: Harmon Kibbe, Chas. Belknap, Ben Tyre, Sam Goodman and Art. Cadman. Rolled Glass: Lou Webster, Laverne Kibbe and Chas. Raphael. Mirrors and Crystal Sheet: Frank Herrick, Gene Palmuth and Geo. Fitzgibbon. The new Mirror Manufacturer's Code was unanimously approved by the vote of the membership.

One of the finest addresses of the convention was delivered Thursday morning by Harry Brawner on "What is a Jobber?". Mr. L. H. Kibbe spoke on Friday evening on "Business Standards". Other speakers were Herbert Mayorga, Libby-Owens-Ford Glass Company, R. M. Paxton, Mississippi Glass Company, W. R. Crawford of the Blue Ridge Glass Corporation.

Friday afternoon was taken up by golf. The grand finale was the football party Saturday afternoon when Stanford defeated the Southern California Trojans 13 to 7.

Indianapolis Glassware Display

Hundreds of pieces of early American glassware and china, much of it of historical significance, recently was displayed by the L. S. Ayres & Company department store under auspices of The Children's Museum of Indianapolis.

One of the outstanding exhibits was a table set entirely of milk glass. Another part set of glass featured the lion pattern and was made by the Sandwich Glass Company to commemorate the laying of the Atlantic cable. According to the data, the lion represented England and the rope design, also included in the decoration, represented the cable.

A glass cake stand that attracted considerable notice bore imprints of eight silver dollars dated 1892. Another collection included old-fashioned drug store bottles filled with colored water.

More than forty Indianapolis glass and china collectors contributed prize pieces for the exhibit.

(*Continued from page* 127)

Member at large, M. E. Holmes, New York State College of Ceramics.

It was decided that membership be limited to companies operating in the State of New York and making products out of non-metallic, earthy raw materials by firing operations or in the production of the important ceramic raw materials. Two classes of membership were established; voting and non-voting. The first class is to be made up of corporations or companies and the latter of individuals.

Temporary by-laws were adopted which state the purpose of the Association and the basis for membership. The Board of Directors are to submit permanent by-laws at the next meeting. A resolution supporting the College's request for an Experiment Station appropriation was adopted. At 4:00 P.M. the meeting adjourned, confident that an unusually favorable start had been made in building up a strong ceramic association for the State of New York.

Just after adjournment came the sad news of the serious injury of Ross Purdy and George Bole in an automobile accident which occurred while they were driving from Columbus to the meeting.

We have since received a report that both Mr. Purdy and Mr. Bole are recovering favorably.

Effect of Glass Containers On the Electromotive Force of Weston Normal Cells

The Weston normal cell is the primary standard for electromotive force. It is, therefore, important that the electromotive force of such cells should be both reproducible and constant. Pure materials are required in order to construct cells that shall have the same electromotive force within a few microvolts, and many studies have been made of the stability of the ingredients. In the past, however, but little attention has been paid to the effects produced by the glass containers. It is well known that certain kinds of glass are appreciably soluble in water and in various solutions. In addition it is known that inequalities in the acidities of the electrolyte in various parts of the cell may result in large changes in electromotive force. A series of experiments has therefore been made at the Bureau to determine whether changes in the acidity of the electrolyte produced by the slight solubility of the glass walls of the cell would produce appreciable changes in electromotive force. The results were published as Research Paper No. 588 in the August number of the Bureau of Standards Journal of Research. It has been found possible to accelerate the experiments by adding samples of glass in powdered form to the mercurous-sulphate paste. The effects of the powdered glass have been found to parallel the behavior of standard cells, prepared in the ordinary manner, over a much longer period of time. Various chemical compounds have also been added to the paste to test their effect on the electromotive force of the cells. The effect of the various added materials has been found to be surprisingly large, and as a result of the investigation the glass containers have been redesigned with a view to improving the constancy and portability of the cells.—*Technical News Bulletin.*

(*Continued from page* 130)

Historia Regum Brittannica told of one such attempt which ended tragically.

The tale relates to Bladud, an Irish Druid who had kept the fires in The Temple of Minerva and who belonged to an early British race not completely emerged from the mysticism of semi-civilization. Bladud attempted to fly over the city of Trinovantum, with disastrous results to himself and his invention.

Spence quotes from Geoffrey's book, this paragraph:

> "Bladud attempted to fly above the earth with wings which he had prepared, and fell down upon the Temple of Apollo in the city of Trinovantum (now London) where he was dashed to pieces."

When one compares Bladud's attempt to fly with the feats performed by modern airplanes it will be well to remember that small progress was made in the following several hundred years since Bladud's accident, toward the perfection of practical flying machines.* The modern type did not come into general use until this century, and even such planes equipped with every modern facility for speed and safety, such as powerful power plants, ingenious instruments controlling the navigation of the plane, cabins furnished with safety glass windows, and other notable inventions of this age, frequently meet with the same fate that Bladud suffered.

Figures presented at the meeting of the International Air Traffic Association in London show that the world's air lines cover today more than 200,000 miles as compared with 9,000 miles in 1928. Air transportation has thus made immense strides in the last five years and may be expected to advance on an even greater scale in the next five.—(*Kingston Whig-Standard.*)

*When in 1920 Pope Benedict XV looked about for a patron saint for airmen, he had not far to seek. At Loreto, overlooking the Adriatic, stood a Holy House which, by legend, was the onetime residence of the Virgin Mary in Nazareth. When in 1263 the Turks threatened it with destruction, a squadron of angels is supposed to have picked up Mary's house and flown it to a place near Fiume, thence to Loreto. By the Pope's decree the Blessed Virgin Mary of Loreto became "special patron with God of all things aeronautic."—*N. Y. Times,* June 20, 1933.

The National Glass Distributors Association's annual meeting which will be held at Pittsburgh on December 6 and 7 at the William Penn Hotel has outlined the following program:

On Wednesday, December 6, luncheon will be served in the Silver Room at 12:30 P.M. The general meeting will come to order at 2 P.M. in the Cardinal Room, and at 6:30 P.M. the annual dinner will take place at the Urban Room. It will be on the order of a Dutch treat with a charge of $5.00 per person to cover the cost of dinner, entertainment, music, flowers, etc. It promises to be the high spot of the meeting.

The program for Thursday, December 7, calls for the general meeting in the Cardinal Room at 10 A.M., followed by a buffet luncheon in the Urban Room at 1 P.M.

The New Large Field Polariscope for Glass

A radically new type of polariscope, designed by practical glass men especially for testing strains in annealed glass and unusually sensitive in operation, has lately been made available to the trade in general by The Simpson Foundry and Engineering Company of Newark, Ohio.

This new instrument, it is said, embodies the conclusions drawn by its progenitors during their 15 years of experience on the art of annealing glass. That it has proved itself to be an efficient, reliable and convenient instrument for practical use is indicated by the fact that it has already replaced polariscopes of other types in quite a number of prominent glass plants, including the Corning Glass Works, The Kimble Glass Company and the electric bulb works of the General Electric Company.

The "Simpson" is a radical departure from previous conventional designs. In it have been combined the latest improvements for obtaining the highest possible sensitivity. Another notable feature is the large field of view which this new device provides for the inspection of strains in the glass. Still another feature is its adaptability to colored glasses. Many tints and colors may be tested on this medium strain-finder.

The Instrument (substantial in construction) has a field 15⅜" square, the height of field above floor is 3'-10", width 19½"; depth 21". Height of instrument overall is 5'-7⅝" and shipping weight 170 lbs. No dark room or hood is required. Price quotations and descriptive prints and matter may be obtained from The Simpson Foundry and Engineering Company, Newark, Ohio.

The Department of Ceramic Engineering of the University of Illinois, Urbana, Illinois, announce that plans are being made for a series of short courses to be given in late January 1934. These will be: 1. Bodies and glazes; 2. Enamels; 3. Structural clay products. Programs will be sent to applicants.

The American Ceramic Society will hold their annual convention in Cincinnati, Ohio, February 11 to 16, 1934.

The American Cyanamid Company has acquired the General Explosives Corporation, manufacturers and distributors of blasting caps, dynamite, permissible powders, blasting powders and allied products, with general offices and works at Latrobe, Pennsylvania. The General Explosives Corporation will be operated as a Division of the American Cyanamid & Chemical Corporation, 535 Fifth Avenue, New York.

Inquiries Received

582. Where can I get a 16" disk for a telescope mirror?

583. We have an inquiry from Denmark for the names of firms manufacturing glass syringes for medical purposes. Can you supply us with names of responsible firms?

584. Con you furnish me with names and addresses of some manufacturers of black glass such as used for tops of restaurant tables?

Production Man

Wanted: An expert production man for Pacific Coast Bottle Plant. Only interested in man of proven ability. Give references and age in reply. Address "Classified D1".

Readers Wants and Offers

Address answers to all "keyed" ads c/o The GLASS INDUSTRY, 102 Maiden Lane, New York

The Glass Industry

Index to Volume 14, January to December 1933.

The Glass Industry, Inc., New York

ARTICLES

Air, Sand and—By Milan Ten Eyck .. 35
Annual Meeting, of Glass Division, American Ceramic Society 24
Bas-Relief in Wrought Glass, A 88
Blower and Suction Pipe Systems, Fan—By John W. Romig 41
Bulletin — A Separate Publication, The 101
Challenge to Premium Glassware, Meeting the—By Waldon Fawcett 95
Diffusion Combustion and Its Application to Glass Melting—By P. Q. Williams 13
Egyptian Glass—By L. M. Angus-Butterworth 21
Glass Division American Ceramic Society, Annual Meeting of 24
Glass, A Bas-Relief in Wrought 88
Glass, Egyptian—By L. M. Angus-Butterworth 21
Glass Is a Salt—By F. W. Preston .. 85
Glass Is a Lobster—By F. W. Preston 68
Glass-Lined Steel Equipment Made and Where Is It Used, How Is.. 86
Glass Plays Important Part in Rockefeller Center—By R. G. Skerrett.. 125
Glass, Roman—By L. M. Angus-Butterworth 65
Glass Trade, The Notable Progress in the 97
Glass Signs, Bent—By C. E. Avery .. 99
Glass Containers for Varied Purposes, Blowing—By R. G. Skerrett .. 105
Glass Tanks, "Stingout" Openings—By John W. Romig 115
Glass, Professor Silverman's Famous Collection of 118
Glass In The Philippines—By Walter Buchler 122
Glass Mosaic to Adorn Rockefeller Center, Great—By R. G. Skerrett 4
Glassware, Meeting the Challenge to Premium—By Waldon Fawcett .. 95
Glass Melting, Diffusion Combustion and Its Application to—By P. Q. Williams 13
Lenses, Testing Photographic—By H. W. Lee 57
Problem of Seed, The Eternal—By F. W. Noel 1
Pressure and Suction Fans—By John W. Romig 75
Roman Glass—By L. M. Angus-Butterworth 65
Society of Glass Technology, London Section 117
Suction Fans, Pressure and—By John W. Romig 75
Soda-Lime Tank Batch, A Discussion of a Popular—By Irving E. Adams 55
Suction Pipe Systems, Fan, Blower and—By John W. Romig 41
Sand and Air—By Milan Ten Eyck .. 35
Testing Photographic Lenses—By H. W. Lee 57
Two Recent Reviews of Importance—By F. W. Preston 128

MINOR ARTICLES, ABSTRACTS

Alfred's New College 79
Alkali Plant at Corpus Christi, New .. 98
Glass Block Building Featured at Century of Progress Fair 91
Glass and Ceramics, International Congress of 102
Glass Container Freight Rates Greatly Reduced 111
New York Ceramic Industries Association Formed 127
Patent Infringement Suits, Hartford-Empire Files Two .....Adv. 7
Putting Trade Acceptances in the New Deal 131
Tariff Commission Report on Blown Glass Tableware Costs 49

EDITORIALS

A Glass Technologist in the South Seas 22
Ancients Longed to Fly "Like an Eagle" 130
The Chickens Come Home to Roost .. 46
Opal Glasses 46
The Banks 47
America's Oldest Glass Factory 47
Sell American 62
Do We Need a National Trade Association? 70
The Meaning of the Word "Violet" Among Glass Technologists 80
Code 90
New Beer in Old Bottles 90
Small Town Industries 110

NEW BOOKS

The Law of Patents for Chemists ..... June P. 7
The 1933 Standards Year Book. June P. 7
Le Travail Et Le Faconnage Decoratif Du Verre (Manufacture and Decorating of Glassware) 83

TRADE STATISTICS AND DATA

Current Prices of Glass Making Materials 12, 26, 40, 54, 64, 74, 84, 94, 104, 114, 124, 134
Trade Inquiries Received 53, 132
Industrial and Trade News ..... 53, 66 June, P. 7, 92, September, P. 7, 113, 132
Plate Glass Production.... 11, 33, 53, 63, 69, 83, 92, Sept. P. 7, October P. 7, November P. 7 131

Statement of the Ownership, Management, Circulation, etc., required by the Act of Congress of March 3, 1933, of The GLASS INDUSTRY, published monthly at New York, N. Y., for October 1, 1933, State of New York, County of New York,—ss. Before me, a Notary Public, in and for the State and County aforesaid, personally appeared H. Glass, who, having been duly sworn according to law, deposes and says that she is the business manager of The GLASS INDUSTRY, and that the following is to the best of her knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of Mar. 3, 1933, embodied in section 443, Postal Laws and Regulations printed on the reverse of this form to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Glass Industry Publishing Co., Inc., 102 Maiden Lane, New York; editors, none; managing editor, G. W. Cooper, 102 Maiden Lane, New York, Business Manager, H. Glass, 102 Maiden Lane New York.

2. That the owners are (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock): Glass Industry Publishing Co., Inc., 102 Maiden Lane, New York, G. W. Cooper, 102 Maiden Lane, New York, R. D. Proctor, 102 Maiden Lane, New York.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are (If there are none, so state): None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders, and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements, embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. H. Glass, Business Manager. Sworn to and subscribed before me this 25th day of September 1933. (Seal) Murray I. Burstein, Notary Public. (My commission expires March 1934.)

Current Prices of Glass-Making Materials

as of November 23, 1933.

Quotations furnished by various producers, manufacturers and dealers

Acid		Carlots	Less Carlots
Citric (dom.)	lb.	...	.29
Hydrochloric (HCl) 20° tanks	Per 100 lb.	...	1.10
Hydrofluoric (HF) 60% (lead carboy)	lb.	...	.13½
52% and 48%	lb.	.10	.10-.11½
Nitric (HNO_3) 38° carboy ext.	Per 100 lb.	5.50	...
Sulphuric (H_2SO_4) 66° tank cars	ton	15.50	...
Tartaric	lb.	... Po. or Gr. .25 / Cry. .25½	
Alcohol, denatured	gal.	...	...
Aluminum hydrate ($Al(OH)_3$)	lb.	.04-.04½	.05½-.06
Aluminum oxide (Al_2O_3)	lb.	.07	.09
Ammonium bifluoride (NH_4FHF)	lb.	...	15¼
Ammonia water (NH_4OH) 26° drums	lb.	...	.02¾
Antimony, metallic (Sb)	lb.	.02½	.02¾
Antimony oxide (Sb_2O_3)	lb.	.08	.08½
Antimony sulphide (Sb_2S_3)	lb.	...	.08½
Arsenic trioxide (As_2O_3) (dense white) 99%	lb.	.04	.04½
Barium carbonate ($BaCO_3$), Crude, (Witherite) 90%, 99% through 200 mesh	ton	56.50	61.50
90% through 100 mesh	ton	44.00	...
Barium hydrate ($Ba(OH)_2$)	lb.	...	.05¾
Barium mixture, glassmaker's, f. o. b. St. Louis	ton	25.00	...
Barium nitrate ($Ba(NO_3)_2$)	lb.	...	.08¼
Barium selenite ($BaSeO_3$)	lb.	...	...
Barium sulphate, in bags	ton	19.00	24.00
Barium sulphate, glassmaker's, carlots, bulk f. o. b. shipping point	ton	15.00-16.00	18.00
Bone ash, carlots	lb.	.06	.06½
Borax ($Na_2B_4O_7 10H_2O$)	lb.	...	...
Granulated	In bags, lb.	.02	.02¼-.02½
Powdered	In bags, lb.	.02¼	.02½-.02¾
Boric acid (H_3BO_3)	In bags, lb.	.04¼	.04½-.04¾
Cadmium sulphide (CdS)—			
Red	lb.	...	.60-.75
Orange	lb.	...	.55-.65
Yellow	lb.	...	1.30-1.50
Chromium oxide (Cr_2O_3)	lb.	...	.18¼
Cobalt oxide (Co_2O_3)			
In bbls	lb	...	1.15
In 10 lb. tins	lb.	...	1.25
Copper oxide			
Red (Cu_2O)	lb.	...	.25
Black (CuO)	lb.	...	.17-.19
Black prepared	lb.	...	.22
Cryolite ($Na_3Al\ F_6$) Natural Greenland (Kryolith)	lb.	.08½	.09
Synthetic (Artificial)	lb.	...	.08
Epsom salts ($MgSO_4$) (imported) technical	Per 100 lb.	...	2.40
Feldspar—			
40 mesh	ton	10.00-11.50	
20 mesh	ton	10.00-11.50	
Granular	ton	10.00-12.00	
Semi-granular	ton	10.00-11.50	
L. C. L., (Min. 2 tons) $2.00 per ton additional plus charge for bags			
Fluorspar (CaF_2) domestic, ground, 96-98% (max SiO_2, 2½%)			
Bulk, carloads, f. o. b. mines	ton	30.00	...
In bags or barrels	ton	34.00	39.00
Imported	ton		
Formaldehyde	lb.	...	.07
Graphite (C)	lb.	...	.04-.07
Iron oxide—			
Red (Fe_2O_3)	lb.	...	.0425
Black (FeO)	lb.	.04½	...
Kaolin (f. o. b. mine)	ton	8.00-9.00	...
English, lump, f. o. b. New York	ton	14.50-25.00	24.50-30.00

Kryolith (see Cryolite)		Carlots	Less Carlots
Lead chromate ($PbCrO_4$)	lb.	...	.30
Lead oxide (Pb_3O_4) (red lead)	lb.	.0680	..0775
Litharge (PbO)	lb.	.0580	.0675
Lime—			
Hydrated ($Ca(OH)_2$) (in paper sacks)	ton	9.00	...
Burnt (CaO) ground, in bulk	ton	6.50	...
Burnt, ground, in paper sacks	ton	8.50	...
Burnt, ground, in 280 lb. bbls	Per bbl.	2.15	2.30
Limestone ($CaCO_3$)		1.50-2.50	...
Magnesia (MgO)—			
Calcined, heavy (in bbls)	lb.	.06	.07
light (in bbls)	lb.	...	.23
extra light (in bbls.)	lb.	...	.37
Magnesium carbonate ($MgCO_3$)	lb.	.06	.10
Manganese 85% (MnO_2)	lb.	57.50	62.50
Nickel oxide (Ni_2O_3), black— for nickel content	lb.	...	.35
Nickel monoxide (NiO), green— for nickel content	lb.	...	.35
Plaster of Paris, bags	ton	31.00	23.00-29.00
Potassium bichromate ($K_2Cr_2O_7$)—			
Crystals	lb.	.08½	.08⅝
Powdered	lb.	.08¾	.09⅛
Potassium carbonate	lb.	.0825	.0875
Calcined (K_2CO_3) 96-98%	lb.		
Hydrated 80-85%	lb.	.07¼	.0775
Potassium chromate (K_2CrO_4)	lb.	...	.14¼
Potassium hydrate (KOH) (caustic potash)	lb.	.07½	.09
Potassium nitrate (KNO_3) (gran.)	lb.	...	.06-.06¼
Potassium permanganate ($KMnO_4$)	lb.	.17½	.18
Powdered blue	lb.	...	.23
Rochelle salts, bbls	lb.	..	.12½
Rouge	lb.	... Po. or Gr. / Cry.	.13½
Rutile (TiO_2) powdered, 95%	lb.	.15-.20	.20-.25
Salt cake, glassmakers (Na_2SO_4)	ton	18.00	...
Selenium (Se)	lb.	...	1.70
Silver nitrate (AgNO)	(100 oz.) per oz.	...	.31
Soda ash (Na_2CO_3) dense, 58%—			
Bulk	Flat Per 100 lb.	1.10	...
In barrels	Per 100 lb.	1.50	...
In bags	Per 100 lb.	1.25	...
Sodium bichromate ($Na_2Cr_2O_7$)	lb.	.06⅛	.06⅜
Sodium hydrate (NaOH) (caustic soda) Solid	Per 100 lb.	2.50	...
Sodium nitrate ($NaNO_3$)—			
Refined (gran.) in bbls	lb.	...	3.62
95 per cent	Per 100 lb.	1.195-1.295	1.245-1.345
Sodium selenite (Na_2SeO_3)	lb.	...	2.00
Sodium fluosilicate (Na_2SiF_6)	lb.	.04½	.05-.06
Sodium uranate (Na_2UO_4) Yellow or Orange	lb.	...	1.50-1.55
Sulphur (S)—			
Flowers, in bbls	Per 100 lb.	3.45	3.70-4.05
Flowers, in bags	Per 100 lb.	3.10	3.35-3.65
Flour, heavy, in bbls	Per 100 lb.	2.85	3.20-3.45
Tin chloride ($SnCl_2$) (crystals)	lb.	.39	.39½
Tin oxide (SnO_2) in bbls	lb.	...	.58
Uranium oxide (UO_3) (black, 96% U_3O_8) 100 lb. lots. Black	lb.	...	2.75
Yellow orange	lb.	...	1.50
Zinc oxide (ZnO)	lb.	.08½	.12
American process, Bags	lb.	.05¾	.06
Zircon			
Granular (Milled .005-.02c higher)		.07	.67½-.08
Crude, Gran. (Milled .005-.02c higher)		.03½	.04-.05

1830 46